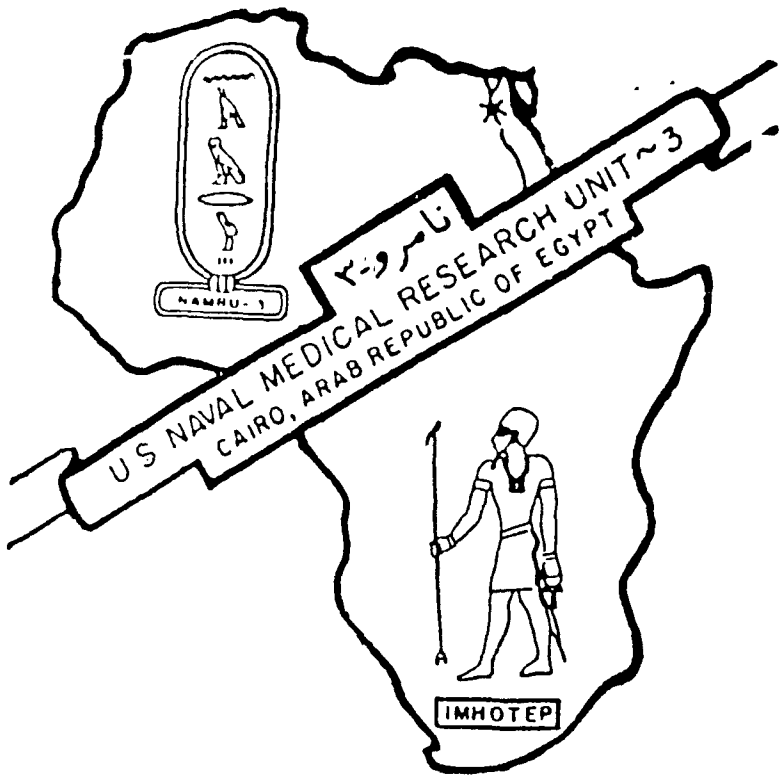

TECHNICAL REPORT

1/94

ENTOMOLOGICAL AND RIFT VALLEY FEVER SURVEILLANCE SUPPORT
TO OPERATION BRIGHT STAR FY94

By

Steven M. Presley, Stanton E. Cope and Robert G. Esquire

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Operational vector surveillance and preventive medicine assistance, both personnel and materiel, were provided to U.S. military medical support element(s) of the biennial OPERATION BRIGHT STAR 94. Troop deployment phase of this joint military exercise between United States and Egyptian armed forces was conducted during the period 31 October through 23 November 1993. Preventive medicine concerns, particularly the threat of Rift Valley fever (RVF), in and around areas into which the exercise would occur prompted requests for assistance from various cognizant preventive medicine offices. Arthropod surveillance field teams and essential logistic and administrative support elements were established in response to specific requests. Aggressive arthropod surveillance operations were initiated on 08 November 1993, and were conducted at both Beni Suef AFB and Cairo West AFB throughout the exercise. Overall, almost 1,000 mosquitoes were collected during 126 trap-nights of the survey. Culex pipiens was the most prevalent species collected, accounting for more than 87% of the overall total specimens captured, while Cx. perexiguus and Ae. caspius made up 3.6% and 7.9%, respectively. Two potential malaria vectors, An. pharoensis and An. multicolor, accounted for 0.3% and 0.7%, respectively, of the total mosquitoes collected. Additionally, 490 U.S. Troops deployed to Beni Suef AFB were enrolled into an oral diagnostic protocol to assess their exposure to Rift Valley fever. Neither the virological screening of collected mosquitoes, nor salivary screening efforts resulted in detection of Rift Valley fever virus. Professional and technical support provided by NAMRU-3 during BRIGHT STAR 94, indicates how extremely valuable military overseas research laboratories are in supporting deployed troops.

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TECHNICAL REPORT OF ENTOMOLOGICAL AND RIFT VALLEY FEVER SURVEILLANCE SUPPORT to

OPERATION BRIGHT STAR FY'94

U.S. NAVAL MEDICAL RESEARCH UNIT NO.3

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AUG - DEC 1993

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FOOTNOTES

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ABSTRACT

Operational vector surveillance and preventive medicine assistance, both personnel and materiel, were provided to the U.S. military medical support element(s) of the biennial **OPERATION BRIGHT STAR '94**. The troop deployment phase of this joint military exercise between United States and Egyptian armed forces was conducted during the period 31 October through 23 November 1993. Preventive medicine concerns, particularly the threat of Rift Valley fever (RVF), in and around the areas into which the exercise would occur prompted requests for assistance from various cognizant preventive medicine offices. Specific requests for assistance included the provision of personnel, equipment and supplies for arthropod surveillance operations. Arthropod surveillance field teams and the essential logistic and administrative support elements were established. Aggressive arthropod surveillance operations were initiated on 08 November 1993, and were conducted at both Beni Suef AFB and Cairo West AFB throughout the exercise. Overall, almost 1,000 mosquitoes were collected during 126 trap-nights of the survey. *Culex pipiens* was the most prevalent species collected, accounting for more than 87% of the overall total specimens captured, while *Cx. perexiguus* and *Aedes caspius* made up 3.6% and 7.9%, respectively. Two potential malaria vectors, *Anopheles pharoensis* and *An. multicolor*, accounted for 0.3% and 0.7%, respectively, of the total mosquitoes collected. Additionally, 490 U.S. troops deployed to Beni Suef AFB were enrolled into an oral diagnostic protocol to assess their exposure to Rift Valley fever. Neither the virological screening of the collected mosquitoes, nor the salivary screening efforts have thus far resulted in any detection of Rift Valley fever virus. The professional and technical support provided by NAMRU-3 during **BRIGHT STAR '94**, indicates how extremely valuable military overseas research laboratories are to preventive medicine and clinical diagnostic elements supporting deployed troops.

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BACKGROUND AND SIGNIFICANCE

A. INTRODUCTION

Operation **BRIGHT STAR** is a biennial, joint/combined military exercise involving troops of the United States and the host country, Egypt. Participating troops perform a wide variety of maneuvers and cross-training exercises at various locations throughout Egypt, often in remote sites under field and simulated combat conditions. As a result, troops are at increased risk of attack by biting arthropods and resultant potential exposure to arthropod-borne diseases, as well as encounters with venomous animals.

Despite a relatively reduced invertebrate and vertebrate fauna in Egypt due to arid and semiarid climates, a number of arthropod-borne infections including Rift Valley fever, malaria, leishmaniasis and filariasis cause mild, severe or fatal disease in the indigenous human population. Several other arthropod-transmitted pathogens are believed to cause human disease in Egypt and neighboring countries but reliable clinical data are lacking. The morbidity and mortality caused by these diseases in a large, immunologically naive population, such as deploying military troops can be catastrophic unless disease risk assessments are accurate and resultant preventive medicine efforts are timely, appropriate, and thorough (Quin 1982).

The United States Naval Medical Research Unit No. 3 (NAMRU-3) in Cairo, Egypt historically has provided support to **BRIGHT STAR** in a wide variety of areas, including entomology and preventive medicine (NAMRU-3 1987). The purpose of this technical report is to describe entomological and preventive medicine support provided by NAMRU-3 to **BRIGHT STAR '94** and to provide specific recommendations for support of future operational exercises in Egypt.

B. VECTOR-BORNE DISEASE CONCERNS DURING BRIGHT STAR '94

Several arthropod-borne diseases were of concern during **BRIGHT STAR '94**, including:

1. Rift Valley fever

Rift Valley fever (RVF), caused by a *Phlebovirus*, is transmitted by contaminated animal products (blood, tissues, organs), bite of infective arthropods and by infectious aerosols. Normally, the disease is confined to sub-Saharan Africa. In 1977-78, however, RVF invaded Egypt, causing an estimated 200,000 human cases and 600 deaths.

In May 1993, human cases of RVF were again detected in Egypt, specifically in the Aswan Governorate (WHO 1993). Studies conducted by NAMRU-3 indicated that as many as 6,000 people may have been infected in this region alone (Arthur et al. 1993). From mid-August to October, evidence indicated that RVF had spread to the Nile River Delta, including several potential areas of operation during **BRIGHT STAR '94** (WHO 1994). Suspected vectors in Egypt include *Culex pipiens, Cx. perexiguus, Cx. antennatus,* and *Aedes caspius.*

2. Leishmaniasis

This disease, caused by a protozoan that is transmitted by bite of infective sand flies, occurs in both a cutaneous and visceral form in Egypt. Cutaneous leishmaniasis has caused significant disease in members of the Multinational Force and Observers, an international peacekeeping force located in the Sinai Peninsula (Fryauff et al. 1993). The primary vector of cutaneous leishmaniasis in Egypt is believed to be *Phlebotomus papatasi.*

3. Malaria

Malaria, a protozoan transmitted by bite of infective anopheline mosquitos, persists in Egypt as a focal hypoendemic disease. Periodic parasitological and serological surveys have identified several malaria-endemic villages, some of which were adjacent to proposed areas of operation during **BRIGHT STAR '94** (El Said et al. 1986). Confirmed or suspected vectors in Egypt include *Anopheles pharoensis, An. sergentii,* and *An. multicolor.*

4. Phlebotomus fevers

At least two phlebotomus fever virus serotypes (PF Naples and PF Sicilian) are known to cause significant human disease in Egypt (Hoogstraal and Darwish 1981). These viruses are transmitted by bite of infective phlebotomine sand flies. The primary vector in Egypt is believed to be *Ph. papatasi.* During World War II, large numbers of British, American and German soldiers in North Africa and the Mediterranean region were victims of this disease (Tesh 1988).

5. West Nile fever

This mosquito-borne disease, caused by a flavivirus, is highly endemic in the Nile River Delta in Egypt. In one study, 61% of 1,168 human serum samples showed evidence of infection (Taylor et al. 1956). Confirmed or suspected vectors in Egypt include *Cx. perexiguus, Cx. pipiens,* and *Cx. antennatus.*

6. Sindbis virus

Sindbis virus, the most widely distributed of all known arthropod-borne viruses, was first isolated from mosquitoes collected in the village of Sindbis, 30 km north of Cairo, Egypt, in 1952. Serological surveys in the Nile Delta have shown human infection rates as high as 27% (Taylor et al. 1955). Mosquito vectors are believed to be the same as those listed above for West Nile fever.

7. Filariasis

Lymphatic filariasis, caused by the worm *Wuchereria bancrofti* and transmitted by mosquitoes, has been endemic in Egypt since Pharonic times. Recently, the disease has been resurgent; a study of 325,000 residents in 1991 revealed an infection rate of >20% (Harb et al. 1993). The main vector of human filariasis in Egypt is *Cx. pipiens*.

C. VENOMOUS ANIMAL CONCERNS DURING BRIGHT STAR '94

There are several species of poisonous snakes, scorpions and spiders found in the Nile Delta and throughout the deserts of Egypt. Due to the field-oriented nature of **BRIGHT STAR '94**, it was anticipated by preventive medicine personnel that troops would be likely to encounter these venomous animals.

D. RELEVANCE OF ENTOMOLOGICAL SUPPORT DURING BRIGHT STAR '94

Historically in the Middle East, arthropod-borne diseases have had a significant impact on military operations (Quin 1982). An effective and efficient preventive medicine and vector surveillance program can be critical to the successful outcome of an exercise such as **BRIGHT STAR '94**. Such a program is operationally relevant in a number of areas:

- Determination of the presence of potential disease vectors and other health risks.
- Collection and identification of potential disease vectors as well as nuisance arthropods .
- Evaluation of potential risk to troops for acquiring infectious diseases.
- Prevention or management of identified threats.
- Enhancement of overall morale of troops through vector and nuisance pest control.

SUMMARY OF ASSISTANCE PROVIDED

A. REQUEST FOR ENTOMOLOGICAL ASSISTANCE FOR BRIGHT STAR '94

Initial correspondence concerning NAMRU-3's possible role in **BRIGHT STAR '94** took place in late July and early August, 1993. At this time, 1LT Dieser, Commander, 172nd Medical Detachment, was provided with a NAMRU-3 information brochure, documents outlining NAMRU-3's participation in past Operation Bright Star exercises, and NAMRU-3's offer of full support during **BRIGHT STAR '94** in whatever areas were identified as being mutually beneficial.

On 14 October 93, a planning meeting was held in the Medical Zoology Branch, NAMRU-3. The purpose of the meeting was to discuss specifics of NAMRU-3's support of **BRIGHT STAR '94**, especially in the areas of entomology and vector surveillance. During this meeting, Medical Zoology Branch offered the following services:

- Briefings on threats posed by arthropods, arthropod-borne diseases and venomous animals in the areas of operations.

- Pre-deployment site surveys to assess risk of vector-borne disease and status of pestiferous arthropods and venomous animals in potential areas of operation.

- Assist preventive medicine personnel with various aspects of vector surveillance, eg., trap selection, placement of traps, identification of species collected, etc.

- Familiarize preventive medicine personnel with identification of venomous animals. Assist in preparation of reference collection for "show and tell" lectures to incoming personnel.

- Assist Virology Division, NAMRU-3, in pathogen isolation attempts for arthropods collected during surveillance efforts.

- Advise cognizant preventive medicine assets in development and planning of vector/pest management strategies and operations.

On 17 October 93, 1LT Dieser requested support from Medical Zoology Branch, NAMRU-3, in the following areas:

- Specimen collection and identification.

- Briefings on vector-borne disease in the region, with emphasis on Rift Valley fever and leishmaniasis.

♦ Training of personnel on surveillance of arthropods of medical importance found in a desert environment, with emphasis on surveillance of sand flies and ticks.

♦ Equipment, specifically:

★ Sherman traps (10)
★ Sand fly sticky traps
★ Fish tank, 5 gal. (1)
★ Blacklight (1)
★ Tick drag (4)
★ Mosquito breeder (2)
★ Insect display box (2)
★ Styrofoam shipping container (2)
★ Enamel pans (4)

Additionally, 1LT Dieser offered the use of his personnel in NAMRU-3's research project involving the collection of filth flies for pheromone isolation and genetic evaluation.

B. HUMAN RIFT VALLEY FEVER VIRUS SURVEILLANCE

On 31 October a meeting was convened by CAPT Esquire at NAMRU-3, that included key members of Medical Zoology, Animal Resources and Basic Sciences Divisions and the Executive Officer. The purpose was to coordinate NAMRU-3's support of **BRIGHT STAR '94** for maximum effectiveness. It was decided that since vector densities for Rift Valley Fever (RVF) in Beni Suef were high, surveillance should be expanded to include troops deployed in this area. Recent high rates of sheep abortions in nearby Fayoum signalled potential for a RVF outbreak. Beni Suef is south of Cairo, along the Nile on the primary agricultural road linking southern Egypt with the Delta (Fig. 1). There is little doubt that infected animals from southern Egypt transit this area. Roughly 1000 troops had been stationed at the Beni Suef Air Base, many since about 15 October. General blood sampling was considered not justifiable, without widespread supporting symptomatology, which at that time (31 October) did not exist. Clinical workups for patients with symptoms of RVF would include blood draws for RVF testing. For mass screening, however, a new salivary assay under development at NAMRU-3 would be field tested. Sampling would be conducted in the final 2 weeks of the Operation to determine if exposure during the entire 7-weeks had generated immunogenesis against RVF infection.

On 01 November, approval was received from Commanding General, 3rd U.S. ARMY/ARCENT, for **BRIGHT STAR '94** soldiers to volunteer as medical research subjects for a salivary diagnostic study (Blodgett, D.S.; facsimile transmission).

ARTHROPOD AND VECTOR-BORNE DISEASE SURVEILLANCE METHODS

A. DATES AND LOCATIONS OF STUDY

Arthropod vector surveillance operations were initiated during the evening of 08 November 1993 at Beni Suef AFB, and were repeated for the nights of 09, 15, 16, 21, and 22 November 1993. Mosquito trapping operations were conducted at the Cairo West AFB site on the nights of 09, 10, 14, 18, 21, and 22 November 1993. The Beni Suef AFB study site is located ca. 110 km south of Cairo, within the Beni Suef Governorate. The Cairo West AFB study site is located ca. 30 km west-northwest of Cairo proper, within the Giza Governorate (see Fig. 1). A detailed chronology of the surveillance operations is provided in Appendix I.

B. ARTHROPOD SURVEILLANCE

Generalized mosquito surveillance using carbon dioxide (CO_2)-baited Centers for Disease Control (CDC) light traps to determine the identity and population density of potential arthropod-borne disease vectors occurring at both of the major troop bivouacking areas was conducted. Light traps were positioned at locations selected due to their proximity to dense vegetation, standing water, or previously reported high prevalence of mosquito activity. Where possible, light traps were placed within or in close proximity to shower tents and/or latrine tents (see Appendix II). Light traps were in place and operating immediately prior to sunset (ca. 1700 hrs), and continued to operate until they were collected immediately following sunrise (ca. 0630 hrs) the next morning. Mosquitoes were collected from the light trap bags via mechanical aspiration into vented aspirator vials, labelled, and quick-frozen (using Dry Ice) for transport to NAMRU-3. All specimens were identified, sexed and pooled for Rift Valley fever virus isolation attempts, maintaining location and date specificity. Information regarding the acquisition/requisition of arthropod surveillance equipment is provided in Appendix III.

C. VECTOR-BORNE DISEASE SURVEILLANCE

Virus isolation attempts were conducted on pooled mosquito specimens by the Virology Branch, U.S. Naval Medical Research Unit No.3. A total of 42 pools of mosquitoes, composed of 21-*Cx. pipiens*, 8-*Cx. perexiguus*, 6-*Ae. caspius*, 3-*An. pharoensis*, and 4-*An. multicolor*, were used for the Rift Valley fever virus isolation attempts. Frozen arthropod pools were triturated in MEM containing antibiotics. Sera were used as the specimen source from animals and humans. All samples were inoculated into suckling mice (IC), and into cultures of Vero and BHK-21 cells.

Mice (observed for 14d) showing signs of neurological illness were sacrificed and brain tissue removed and used to inoculate cell cultures. Rift Valley fever virus was identified by immunofluorescent staining of infected cells with anti-RVF virus hyper-immune mouse ascitic fluid, and RVF virus-specific monoclonal antibodies.

D. HUMAN RIFT VALLEY FEVER INFECTION SURVEILLANCE

Exploring the possibility that salivary antibodies against Rift Valley fever might be a suitable non-invasive surveillance source for RVF infection among exposed personnel, the team collected salivary specimens from 490 troops. Single, 2 ml. samples were preserved at collection with a protease inhibitor, phenylmethylsulfonylfluoride (PMSF), transported in ice and frozen at the field site (20°F). Upon arrival at NAMRU-3, the specimens were stored at -70°C. Individual survey information was obtained regarding time at the site, estimated number of insect bites, history of overseas assignments, and illness encountered during the deployment.

ARTHROPOD AND VECTOR-BORNE DISEASE SURVEILLANCE RESULTS

Mosquito surveillance results show similar population composition between Beni Suef AFB and Cairo West AFB. There was greater diversity in species occurring at Beni Suef, with five different species represented, including *Culex pipiens*, *Cx. perexiguus*, *Aedes caspius*, *Anopheles pharoensis* and *An. multicolor*. Mosquito species composition at Cairo West consisted of *Cx. pipiens*, *Cx. perexiguus* and *Ae. caspius*. Table 1. provides a descriptive statistical summary of the mosquito surveillance results.

Table 1. **Descriptive statistical summary of mosquito surveillance results.**

	BENI SUEF	CAIRO WEST	OVERALL
TOTAL TRAP-NIGHTS	76(60.3)a	50(39.7)	126
Cx. pipiens	422(79.0)b	427(98.0)	849(87.4)
Cx. perexiguus	27(5.0)	8(1.8)	35(3.6)
Ae. caspius	75(14.0)	2(0.2)	77(7.9)
An. pharoensis	3(0.6)	0	3(0.3)
An. multicolor	7(1.3)	0	7(0.7)

[a] - Values in parentheses are the percentage of total trap-nights per specific site.

[b] - Values in parentheses are the percentage of the total mosquito collection from the specific site.

Overall, almost 1,000 mosquitoes were collected during 126 trap-nights of the survey. *Culex pipiens* was the most prevalent species collected, accounting for more than 87% of the overall total specimens captured, while *Cx. perexiguus* and *Ae. caspius* made up 3.6% and 7.9%, respectively. Two potential malaria vectors, *An. pharoensis* and *An. multicolor*, accounted for 0.3% and 0.7%, respectively, of the total mosquitoes collected.

A. BENI SUEF AFB, BENI SUEF GOVERNORATE, EGYPT

The number of mosquitoes collected from Beni Suef AFB during 76 trap-nights of surveillance totalled 534, accounting for ca. 55% of overall mosquito collections (while 60.3% of total trap-nights were conducted here) (Table 1). *Culex pipiens* was the predominate species, making-up ca. 79.0% of the total specimens

captured. The second most numerous species collected, *Ae. caspius*, contributed only 14.0% of the total mosquitoes collected. *Cx. perexiguus* comprised 5.0% of the collections, while *An. multicolor* and *An. pharoensis* were 1.3 and 0.6%, respectively (Table 1, Fig. 2).

Comparison of the mean number of mosquitoes per light trap for each species collected, by date of collection, is provided in Table 2 and Figure 3. Significantly (**P** > 0.01) greater numbers of *Cx. pipiens* were collected on 15 November, than on any of the other dates. Statistically significant (**P** > 0.01) differences in mean numbers of *Cx. pipiens* per light trap were shown between all dates, with the 22 November collection period yielding the least. Mean number of *Cx. perexiguus* per trap was significantly (**P** > 0.01) more abundant during the 09 November collections. Additionally, recovery of *Ae. caspius* during the 09 November trapping period was significantly (**P** > 0.01) greater than that on the other collection dates. Comparison of mean numbers of *An. pharoensis* and *An. multicolor* by collection date showed only slight differences between dates.

Table 2. Comparison of mean number of mosquitoes collected per species[1] by date using CO_2-baited CDC light traps, Beni Suef AFB, Egypt.

DATE COLLECTED	MEAN MOSQUITOES / TRAP[2]				
	Cx.pip.	*Cx.per.*	*Ae.cas.*	*An.pha.*	*An.mul.*
08 NOV 93	4.3 **E**	0.5 **B**	1.1 **B**	0.1 **A**	0.0 **C**
09 NOV 93	6.5 **C**	1.0 **A**	1.7 **A**	0.0 **B**	0.0 **C**
15 NOV 93	7.8 **A**	0.2 **D**	0.5 **E**	0.0 **B**	0.2 **A**
16 NOV 93	4.4 **D**	0.1 **E**	0.6 **D**	0.0 **B**	0.1 **B**
21 NOV 93	7.5 **B**	0.4 **C**	1.1 **B**	0.1 **A**	0.2 **A**
22 NOV 93	2.7 **F**	0.1 **E**	1.0 **C**	0.1 **A**	0.1 **B**

[1] = Species reported: *Culex. pipiens, Cx. perexiguus, Aedes caspius, Anopheles pharoensis, An. multicolor.*

[2] = Mean values for each species (by date) within a column, followed by the same letter, are not significantly different (*P>0.01*, DF=55, Tukey (HSD) pairwise comparison of means).

Comparison of mean values among dates within a species reveals significant population flucuations from collection period to collection period. However it should be noted that numerous technical, biotic and ambient factors significantly influenced these values. These influencing factors include, but are not

limited to, 1) sample size (number of traps/mosquitoes); 2) mosquito age, reproductive status, and the availability of alternate hosts; 3) weather conditions (temperature, relative humidity, photoperiod, wind velocity, etc...); and 4) pest control measures utilized within the collection sites.

B. CAIRO WEST AFB, GIZA GOVERNORATE, EGYPT

Mosquito trapping operations at Cairo West AFB collected 437 specimens, which comprised ca. 45% of overall mosquitoes collected (39.7% of total trapping was conducted at Cairo West) (Table 1). *Culex pipiens* was by far the most numerous species collected, comprising 98% of all collected specimens. Minimal numbers of *Cx. perexiguus* and *Ae. caspius* were collected, constituting 1.8 and 0.2% of the Cairo West AFB mosquito collections (Table 1, Fig. 4).

Comparisons of the mean number of mosquitoes per light trap by date within species reveals significantly (**P** > 0.01) more *Cx. pipiens* (31.3/light trap) were collected on 21 NOV 93 than on any of the other collection dates. Mean numbers of *Cx. pipiens* decreased significantly (**P** > 0.01) within one day after 21 NOV 93 collections, from 31.3 mosquitoes per light trap to 10.9 mosquitoes per light trap for the 22 NOV 93 collections. The mean number of *Cx. perexiguus* per light trap was greatest during the 22 NOV 93 trapping period (Table 3, Fig. 5).

Table 3. **Comparison of mean number of mosquitoes collected per species by date using CO_2-baited CDC light traps, Cairo West AFB, Egypt.**

DATE COLLECTED	MEAN MOSQUITOES / TRAP[1]		
	Cx. pipiens	*Cx. perexiguus*	*Ae. caspius*
09 NOV 93	3.0 **D**	0.0 **D**	0.0 **B**
10 NOV 93	3.1 **C**	0.0 **D**	0.0 **B**
14 NOV 93	2.3 **E**	0.0 **D**	0.0 **B**
18 NOV 93	2.2 **F**	0.1 **C**	0.0 **B**
21 NOV 93	31.3 **A**	0.6 **A**	0.3 **A**
22 NOV 93	10.9 **B**	0.3 **B**	0.0 **B**

[1] = Mean values for each species (by date) within a column, followed by the same letter, are not significantly different (*P>0.01*, DF=35, Tukey (HSD) pairwise comparison of means).

C. RIFT VALLEY FEVER VIRUS SCREENING

Mosquitoes were screened for the presence of Rift Valley fever virus by the Virology Branch, NAMRU-3. A total of 42 pools of mosquitoes, comprised of 967 total specimens were screened. There was no suspected nor positive detection of RVF virus in any of the pools screened.

D. ADDITIONAL ENTOMOLOGICAL SUPPORT

In addition to the primary support provided via the mosquito surveillance operations, numerous miscellaneous arthropod specimens were submitted for identification and medical importance summary. The following list provides the pertinent facts regarding these submissions (copies of DD-1222's attached as Appendix IV):

#1. **Date submitted:** 21 OCT 93
Submitted by: 1LT E.M. DIESER, 172ND MED DET
Source of specimens: Random collection
Identity and importance:

a. Scorpion, Family: Buthidae, venomous/aggressive.
b. Sun Spider, Order: Solpugida, non-venomous/ aggressive.
c. Mosquitoes, *Cx. pipiens*, primary vector of RVF and human filariasis in Egypt.

#2. **Date submitted:** 09 NOV 93
Submitted by: 1LT M.J. SARDELIS, 172ND MED DET
Source of specimens: CDC light trap
Identity and importance:

a. Mosquitoes, *Cx. perexiguus*, 2-females.
b. Mosquitoes, *Cx. pipiens*, 2-males/5-females.

#3. **Date submitted:** 16 NOV 93
Submitted by: 1LT M.J. SARDELIS, 172ND MED DET
Source of specimens: a. Sticky traps, b. & c. Random
Identity and importance:

a. Miscellaneous beetles and wasps, Coleoptera and Hymenoptera.
b. Scorpion, *Buthus occitanus*, mod-high toxic venom.
c. Scorpion, *Buthotus* sp., low-mod toxic venom.

#4. **Date submitted:** 16 NOV 93
Submitted by: Capt L. SPANGLER, OPER. RESTORE HOPE
Source of specimens: Dried rice (Hotel)
Identity and importance:

a. Confused flour beetles, *Tribolium confusum*, 25 specimens (Condemn @ levels ≥ 3/1 lb sample).
b. Saw-toothed grain beetles, *Oryzaephilus surinamensis*, 3-specimens (Condemn @ levels ≥ 7/1 lb sample).
c. Mouse pellets.

#5. **Date submitted:** 22 NOV 93
Submitted by: Capt L. SPANGLER, OPER. RESTORE HOPE
Source of specimens: Dried rice/flour (Hotel)
Identity and importance:
a. No pests found in either sample.

#6. **Date submitted:** 26 NOV 93
Submitted by: Capt L. SPANGLER, OPER. RESTORE HOPE
Source of specimens: Dried rice (Hotel)
Identity and importance:

a. Red flour beetles, *Tribolium castancum*, 2-larvae, 2-adults (Condemn @ levels represented).
b. Saw-toothed grain beetle, *Oryzaephilus surinamensis*, 1-adult.
c. ? flour beetles, *Tribolium* spp., 3-adult. (Too damaged to identify to species).

The Medical Zoology Branch was visited at least once per week by personnel from the 172ND MED DET for reference/literature support.

E. HUMAN RIFT VALLEY FEVER INFECTION SURVEILLANCE

The results of the personnel survey of 490 service members submitting salivary specimens indicated the following:

1. Time at site: **1 to 7 weeks**

2. Estimated number of insect bites per subject:

	Number of bites/subject		
	0-10	10-50	50-100
Responses per Category	**310**	**171**	**9**

3. Number of previous overseas assignments: **0 to 21**

4. Illness encountered during **BRIGHT STAR '94: Six of 490 subjects (1.22%) reported transient fever-like symptoms during the Operation. Blood was drawn as part of overall clinical workups on three of these, which**

were serologically negative for RVF antibodies. The others did not submit clinical blood specimens.

Refinement of laboratory procedures for a novel, Enzyme Linked Immunosorbent Assay (ELISA) for salivary antibodies against RVF, initiated earlier in the current Egypt outbreak (August 93), was completed just prior to this report. Completion of **BRIGHT STAR '94** salivary specimen processing is expected by July 94.

CONCLUSIONS

As with any deployment of military personnel, whether contingency, training or disaster relief related, there is a critical need for accurate real-time information on the actual and potential infectious disease threat in the area of operations. Operation **BRIGHT STAR '94** was not in-itself different in this regard, however the occurrence of a major outbreak of Rift Valley fever in Egypt during the preceding summer had heightened the need for disease threat information. The scientific expertise in infectious disease research, as well as the logistic and technical support capabilities of U.S. Naval Medical Research Unit No.3 were, as in previous **BRIGHT STAR** evolutions, called into action. The information gained and forwarded to the commanders of **BRIGHT STAR '94**, as well as the vector-borne disease reference material provided to preventive medicine personnel and the scientific data generated from the exercise, has once again illustrated the value of U.S. military overseas research facilities to the deployed forces.

A. ARTHROPOD-BORNE DISEASE SURVEILLANCE

Intensive arthropod surveillance efforts throughout the deployment phase of the exercise provided real-time assessment, and allowed timely reporting of potential vector populations to the cognizant preventive medicine officer(s). The relatively high numbers of *Cx. pipiens* at both the Beni Suef AFB and Cairo West AFB sites indicate that the perceived threat of troop exposure to suspected mosquito vectors of RVF was a reality. *Culex pipiens* proved to be the predominant mosquito species at both collection sites, making up 79% of the total mosquitoes collected at Beni Suef AFB, and 98% at Cairo West AFB. Two other suspected vectors of RVF, *Cx. perexiguus* and *Ae. caspius*, were also collected at these sites. Fortunately, virus screening of all mosquitoes collected (967 mosquitoes in 42 pools) during this survey did not indicate the presence of RVF virus (RVFV). Additionally, confirmed and suspected vector species of malaria, *An. pharoensis* and *An. multicolor* respectively, were collected from the Beni Suef AFB site.

Various contributing factors may have possibly influenced the lack of detection of RVFV in the mosquito population, even though active occurrence of the disease had previously been detected in human and livestock populations in the area. Most notably these factors include the location of the bivouacking sites, and the extremely restrictive liberty policies enforced throughout the deployment. Troops deployed to both Beni Suef AFB and Cairo West AFB were billeted, and essentially confined, to "tent cities" surrounded by ca. 1-2 miles of desert. Undoubtedly seasonal factors (i.e., temperature, humidity, and photoperiod)

also significantly affected the mosquito population composition and density during this survey.

B. HUMAN RIFT VALLEY FEVER VIRUS SURVEILLANCE

Very low numbers of cases with fever, coupled with negative insect findings suggest that RVF was a limited threat to troops at either Cairo West AFB, or Beni Suef AFB. Contact with infected animals was essentially nonexistent, as the Beni Suef AFB was about three miles from Beni Suef village, and Cairo West AFB was about six miles from the Giza area of Cairo. Transmission by mosquitoes was essentially the only possible route of infection. Strong immune systems associated with the youth of this population, in contrast with local individuals who become symptomatic, may help explain lack of symptoms if evidence of infection is found in the salivary antibody studies. Symptomatic individuals infected with RVFV are usually considerably older than the subjects in this group and may have relatively weak resistance. Further reducing the probabilities of debilitating symptoms in the **BRIGHT STAR '94** population is the estimate that, of residents infected with RVF virus in endemic areas, only 5% show significant symptomatology.

Salivary antibody studies will reflect the entire period of exposure, whereas, insect collection data are only from the latter weeks of the Operation. Forthcoming information from salivary anti-RVF antibody assays in these troops may reveal levels of asymptomatic infection that can be useful in assessing immunization needs in future deployments to areas of known RVF activity. Early detection through mass screening can focus observation on specific infected individuals for possible preventive intervention with Ribavirin, an investigational new drug.

C. LESSONS LEARNED

Aggressive vector surveillance efforts are critical to predicting and preventing the arthropod-borne disease threat, and/or outbreaks. Arthropod surveillance field operations should be preceded by three primary tasks. First, an intensive review is required of all available information pertaining to the endemic disease threat, potential vector presence and the indigenous disease reservoir population occurring in the specific deployment area. Various sources readily supply this information for almost any country, they include; (1) Navy Disease Vector Ecology and Control Centers at Jacksonville, Florida, and Alameda, California, (2) Defense Pest Management Information Analysis Center at Walter Reed Army Medical Center, Washington, D.C., and (3) Armed Forces Pest Management Board, Walter Reed Army Medical Center, Washington, D.C.. Secondly, in preparation

for arthropod surveillance operations, establishment of critical/essential points of contact for various administrative, logistic and if necessary, security services should be accomplished. Finally, a detailed plan of action or approach should be developed and all surveillance team members should be educated on specific sampling methods, specimen processing and preservation techniques and the "cold chain" maintenance to be used.

It should also be noted that through NAMRU-3's involvement with **BRIGHT STAR '94** other deployed U.S. military units began to request preventive medicine/entomological support. The Preventive Medicine Officer at the Air-Transportable Hospital (ATH) assigned to Operation Restore Hope, and located on Cairo West AFB, regularly utilized the Medical Zoology Branch for arthropod identification, medical importance evaluation, and as a reference point for preventive medicine issues. Additionally, the Office of Military Cooperation (OMC) Medical Officer stationed at the Oasis Compound, Beni Suef AFB, requested support and professional guidance in developing a mosquito control program at the Oasis Compound. In both of the above cases, the cognizant preventive medicine personnel were unaware that professional and technical expertise in preventive medicine was available at NAMRU-3. Efforts should be made in the future to develop and maintain liaison between NAMRU-3 and any deployed, or positioned U.S. troop elements in northern Africa and southwest Asia.

In-country resources for information pertaining to infectious diseases, their vectors and reservoirs, and for scientific and technical laboratory support, allowed NAMRU-3 to provide essential assistance to the preventive medicine elements of **BRIGHT STAR '94.** The demand for these critical scientific and support assets are, and will continue to be, an essential part of any troop deployments into northern Africa and southwest Asia. In actuality the demand for aggressive, comprehensive, and immediate infectious disease information will continue to increase as multinational troop involvement in geo-regional conflicts increases. It is therefore of utmost importance that rapidly deployable infectious disease surveillance assets, including entomological, epidemiological, microbiological and technical support, be "standing by" ready to respond and assist.

REFERENCES CITED

Arthur, R.R., M.S. El-Sharkawy, S.E. Cope, B.A. Botros, S. Oun, J.C. Morrill, R.E. Shope, R.G. Hibbs, M.A. Darwish and I.Z.E. Imam. Recurrence of Rift Valley fever in Egypt. *Lancet 342:* 1149-50.

Blodgett, D.S. Collection of Medical Research Data - Bright Star 94. FAX for Commanding General, THIRD U.S. ARMY/ARCENT, through SURGEON THIRD U.S. ARMY. to CAPT Esquire, NAMRU-3. 1 November 93.

El Said, S., J.C. Beier, M.A. Kenawy, Z.S. Morsy and A.I. Merdan. 1986. *Anopheles* population dynamics in two malaria endemic villages in Faiyum Governorate, Egypt. *J. Am. Mosq. Control Assoc. 2:* 158-63.

Fryauff, D.J., G.B. Modi, N.S. Mansour, R.D. Kreutzer, S. Soliman and F.G. Youssef. 1993. Epidemiology of cutaneous leishmaniasis at a focus monitored by the Multinational Force and Observers in the northeastern Sinai desert of Egypt. *Am. J. Trop. Med. Hyg. 49(5):* 598-607.

Harb, M., R. Faris, A.M. Gad, O.N. Hafez, R. Ramzy and A.A. Buck. 1993. The resurgence of lymphatic filariasis in the Nile Delta. *Bull. W.H.O. 71:* 49-54.

Hoogstraal, H. and M. Darwish. 1981. Arboviruses infecting humans and lower animals in Egypt: A review of thirty years of research. *J. Egypt. Pub. Hlth. Assoc. 61:* 1-112.

Kenawy, M. A., J. C. Beier and S. El Said. 1986. First record of malaria and associated *Anopheles* in El Gara Oasis, Egypt. *J. Am. Mosq. Control Assoc. 2:* 101-103.

NAMRU-3. 1987. Participation in the BRIGHTSTAR - 87 Exercises. Technical Report of 30 September 1987. U.S. Naval Medical Research Unit No. 3, Cairo, Egypt.

Quin, N.E. 1982. The impact of diseases on military operations in the Persian Gulf. *Military Medicine 147:* 728-735.

Taylor, R.M., H.S. Hurlbut, T.H. Work, J.R. Kingston and T.E. Frothingham. 1955. Sindbis virus: a newly recognized arthropod-transmitted virus. *Am. J. Trop. Med. Hyg. 4:* 844-862.

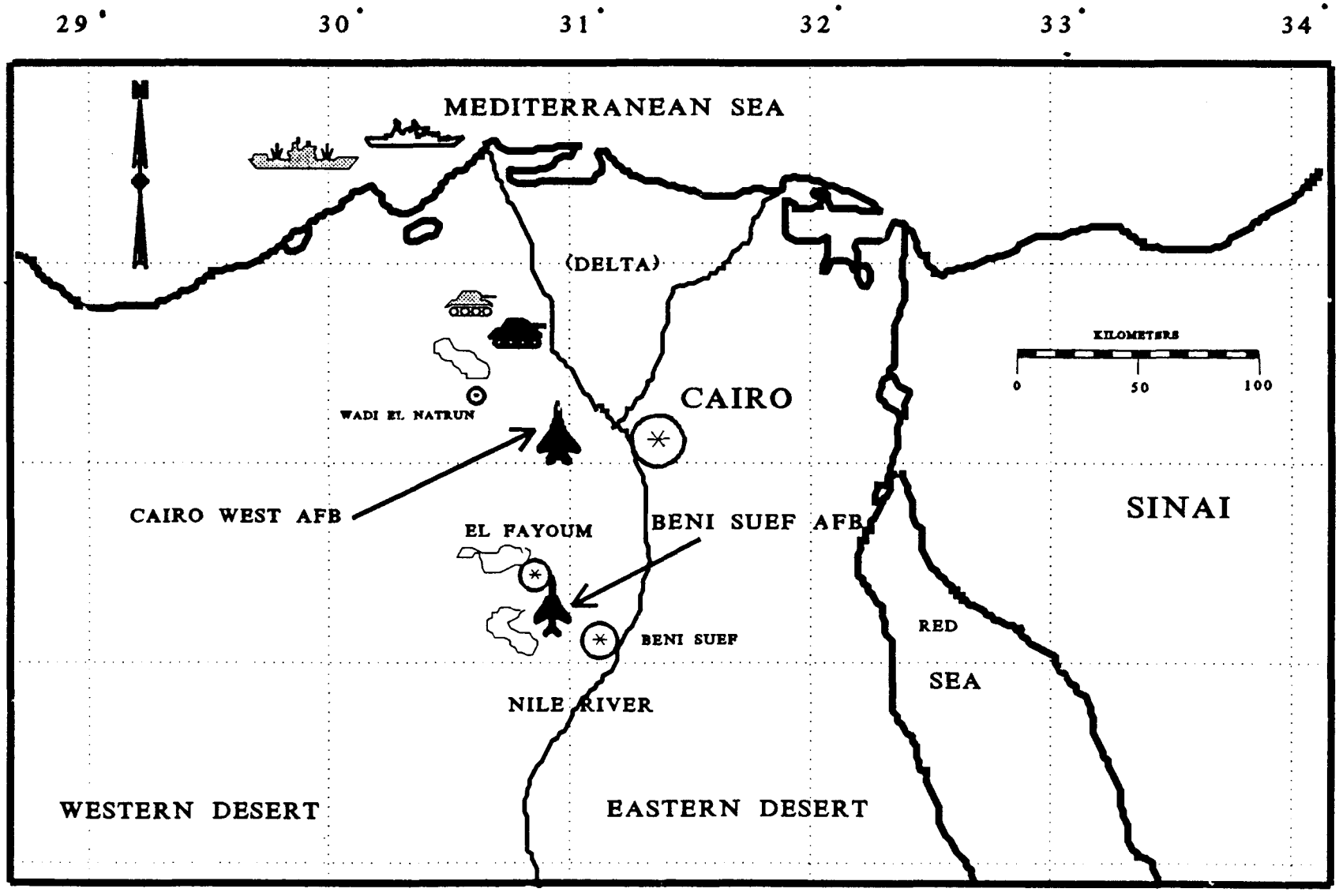
Taylor, R.M., T.H. Work, H.S. Hurlbut and F. Rizk. 1956. A study of the ecology of West Nile virus in Egypt. *Am J. Trop Med Hyg. 5:* 579-620.

Tesh, R.B. 1988. Phlebotomus fevers. In *The Arboviruses: Epidemiology and Ecology, Vol. III.* T.P. Monath (ed.). CRC Press, Inc., Boca Raton, Florida, USA. pp. 234.

WHO. 1993. Rift Valley Fever, Egypt. *Week. Epid. Rec. 41:* 300-01.

WHO. 1994. Rift Valley Fever, Egypt. *Week. Epid. Rec. 10:* 74-6.

FIGURE 1. MAP OF SURVEILLANCE AREAS, OPERATION BRIGHT STAR '94



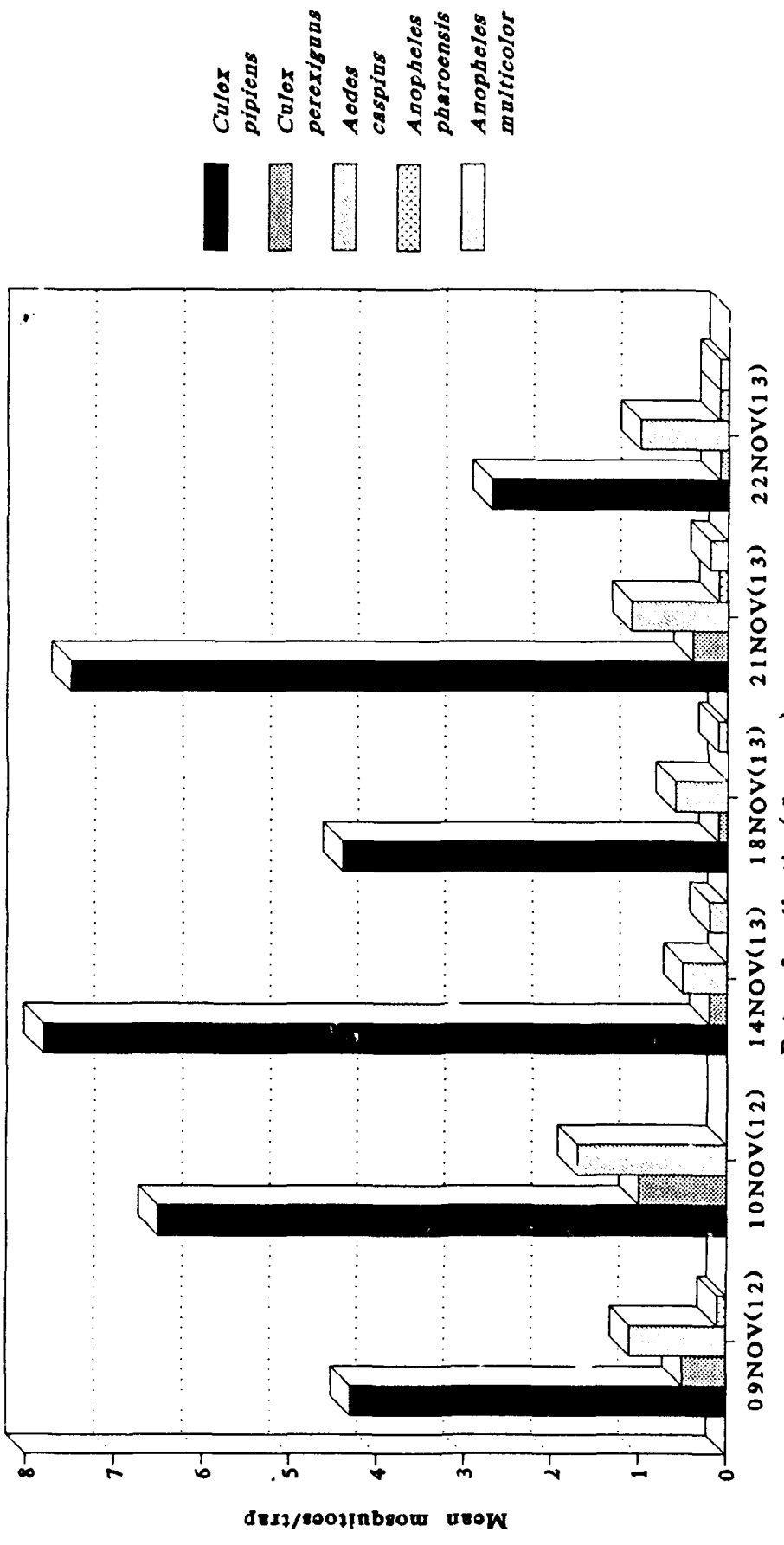


Figure 2. Mean number of mosquitoes collected per trapping period using CO2-baited light traps at selected outdoor and indoor sites of Beni Suef AFB, Egypt

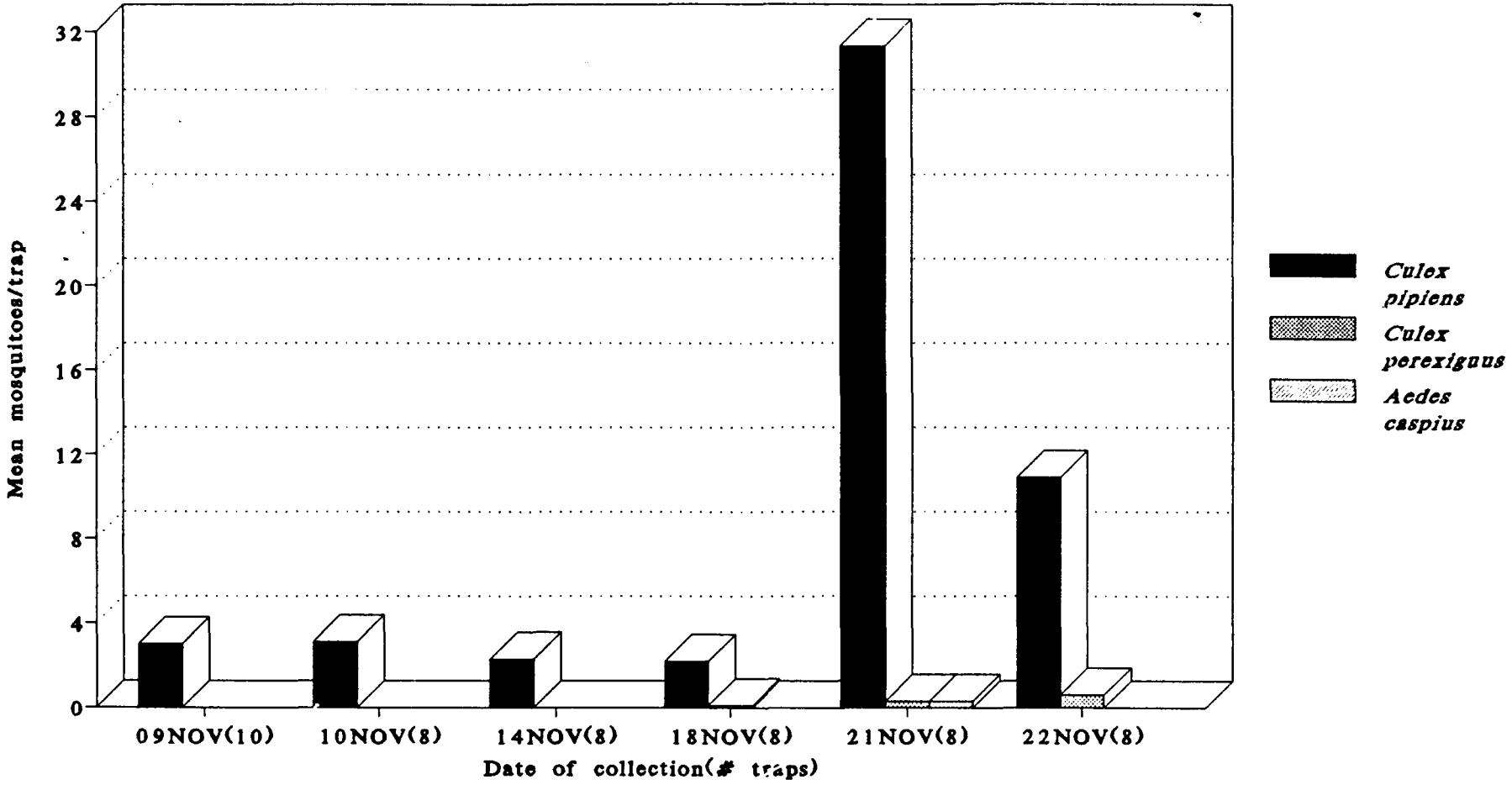


Figure 3. Mean number of mosquitoes collected per trapping period using CO2-baited light traps at selected outdoor and indoor sites of Cairo West AFB, Egypt

BENI SUEF AFB, EGYPT
OPERATION BRIGHT STAR '94

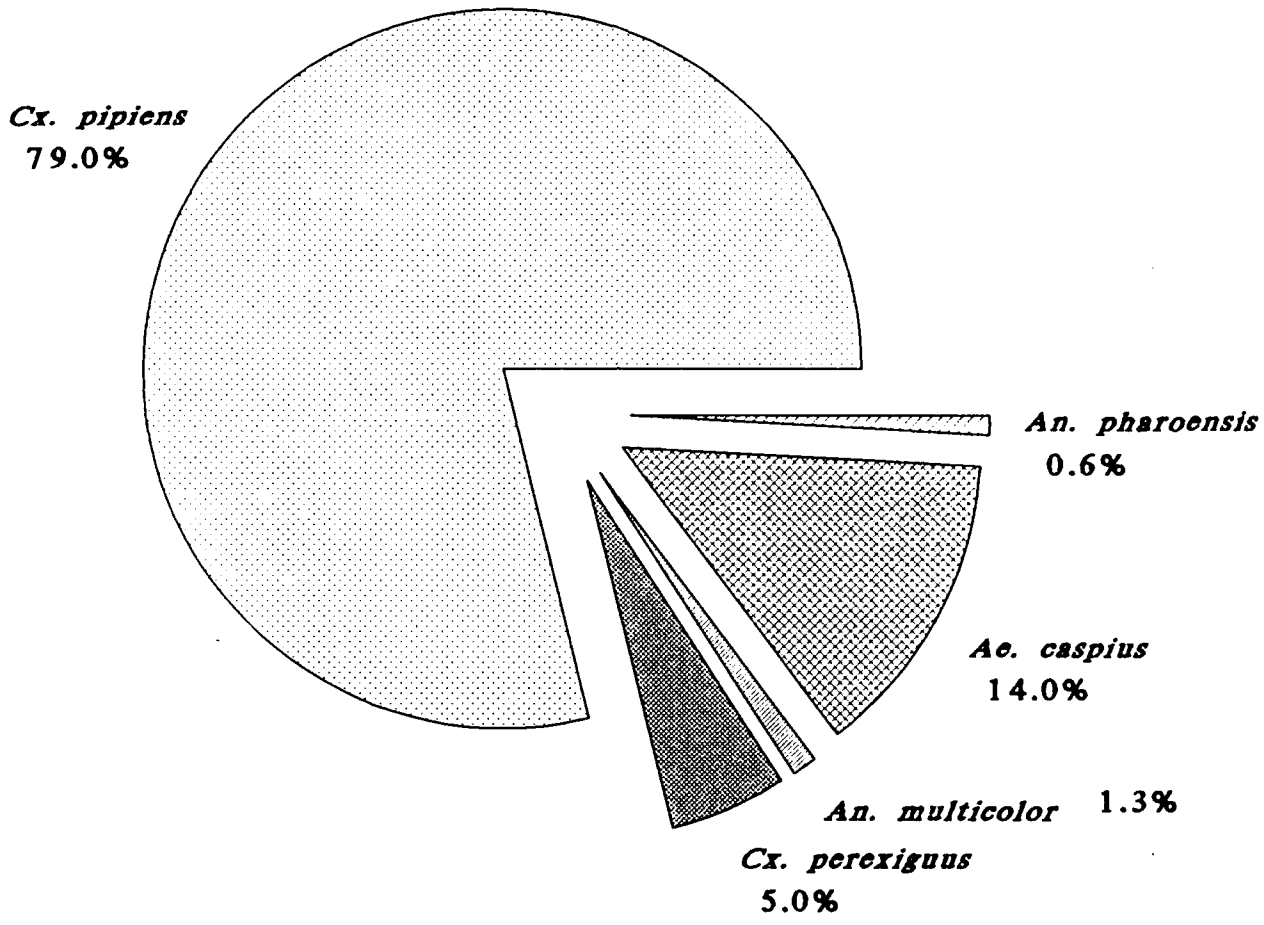


Figure 4. Comparison of overall mosquito population composition by percentage species recovery from 76 total trap-nights, Beni Suef AFB, Egypt

CAIRO WEST AFB, EGYPT
OPERATION BRIGHT STAR '94

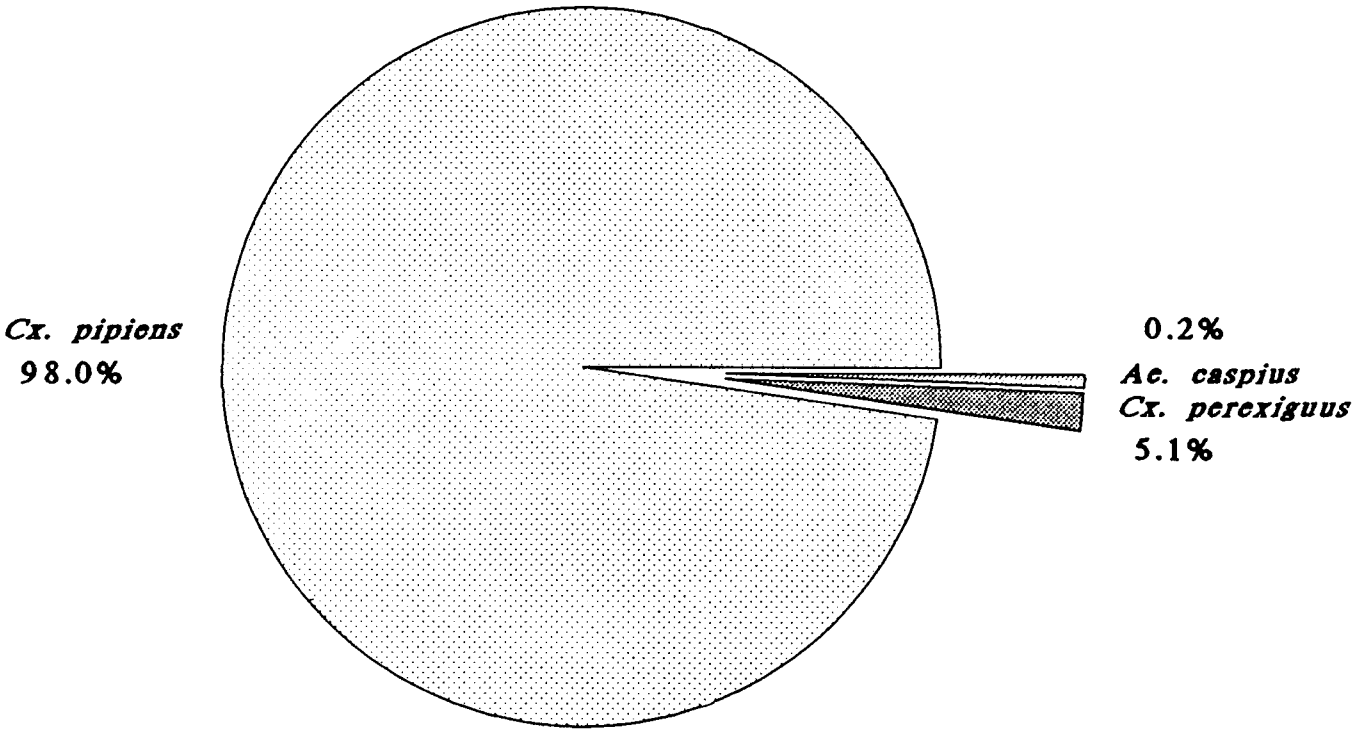


Figure 5. Comparison of overall mosquito population composition by percentage species recovery from 50 total trap-nights, Cairo West AFB, Egypt

APPENDICES

APPENDIX I. SCHEDULE OF ARTHROPOD SURVEILLANCE OPERATIONS, OPERATION **BRIGHT STAR '94**

APPENDIX II. SUPPORTING PHOTOGRAPHS OF ACTIVITIES, OPERATION **BRIGHT STAR '94**

APPENDIX III. ESSENTIAL VECTOR AND RESERVOIR SURVEILLANCE EQUIPMENT

APPENDIX IV. REQUEST FOR AND RESULTS OF TESTS

APPENDIX I

SCHEDULE OF ARTHROPOD SURVEILLANCE OPERATIONS
OPERATION BRIGHT STAR '94

07 NOV 93 SUN:

AM Travel to, and establish working relations with Medical Department personnel at Beni Suef AFB/Oasis Compound, Egypt (LT Presley, HM2 Vanek).

PM Set-up and conduct mosquito trapping operations within Tent City (USAF temporary billeting area) and Oasis Compound (USAF permanent compound), both located upon the Beni Suef Egyptian Air Force Base (LT Presley, HM2 Vanek).

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08 NOV 93 MON:

AM Collect traps/specimens at Beni Suef and transport to NAMRU-3 for processing (LT Presley, HM2 Vanek).

PM Mosquito surveillance team returns to Beni Suef AFB to conduct second night of trapping operations (HM1 Lint, HM2 Vanek).

PM Travel to and establishment of CDC light trap locations at Cairo West AFB. Conduct first night of mosquito trapping operations within various compounds, including those of Operation **BRIGHT STAR '94** and Operation Restore Hope (LT Presley, 1Lt Sardelis).

---

09 NOV 93 TUE:

AM Mosquito traps/specimens collected and transported from both study sites to NAMRU-3 for processing (LT Presley, HM1 Lint, HM2 Vanek).

PM Mosquito surveillance operations repeated at Cairo West AFB (1Lt Sardelis & staff).

---

14 NOV 93 SUN:

AM Mosquito surveillance team returns to Beni Suef AFB to conduct third night of trapping operations (HM1 Fisette, HM1 Lint, HM2 Vanek).

PM Third night of mosquito trapping conducted at Cairo West AFB (1Lt Sardelis & staff).

15 NOV 93 MON:

AM Mosquito traps/specimens collected and transported from Cairo West AFB to NAMRU-3 for processing (LT Presley, 1Lt Sardelis). Specimens collected from Beni Suef maintained at site.

PM Fourth night of surveillance operations conducted at Beni Suef AFB (HM1 Fisette, HM1 Lint, HM2 Vanek).

---

16 NOV 93 TUE:

AM Mosquito traps/specimens collected at Beni Suef AFB, and transported to NAMRU-3 for processing via airlift (CAPT Esquire, LT Presley).

---

17 NOV 93 WED:

PM Fourth night of surveillance operations conducted at Cairo West AFB (1Lt Sardelis & staff).

---

18 NOV 93 THU:

AM Mosquito traps/specimens collected at Cairo West AFB and maintained at site (1Lt Sardelis).

---

20 NOV 93 SAT:

PM Fifth night of surveillance operations conducted at Cairo West AFB (1Lt Sardelis & staff). Fifth night of surveillance operations conducted at Beni Suef AFB (HM1 Fisette, HM1 Lint, HM2 Vanek).

---

21 NOV 93 SUN:

AM Mosquito traps/specimens collected at both Cairo West AFB and Beni Suef AFB, and maintained at respective sites pending transport to NAMRU-3 (1Lt Sardelis, HM1 Fisette, HM1 Lint, HM2 Vanek).

PM Sixth night of surveillance operations conducted at both Cairo West AFB (1Lt Sardelis & staff), and Beni Suef AFB (LT Presley, HM1 Fisette, HM1 Lint, HM2 Vanek).

APPENDIX II

SUPPORTING PHOTOGRAPHS OF ACTIVITIES OPERATION BRIGHT STAR '94

PHOTO #1. Preparation of Dry Ice bait packets, using toweling and aluminum foil (Dry Ice is wrapped in the toweling and then rolled into a cylindrical shape in the aluminum foil).

PHOTO #2. Positioning the CO_2-baited CDC-light trap at optimum height (light traps were positioned at ca. 2 m height).

PHOTO #3. Completed gel-cell powered, CO_2-baited light trap unit in operation (note Dry Ice bait packet suspended above unit).

PHOTO #4. Aspirating collected mosquito specimens from a light trap bag utilizing a mechanical aspirator unit.

PHOTO #1

HM2 MICHAEL J. VANEK, USN LT STEVEN M. PRESLEY, MSC, USN

PHOTO #2

HM2 MICHAEL J. VANEK, USN

PHOTO #3

CAPT ROBERT G. ESQUIRE, DC, USN

PHOTO #4

HM2 MICHAEL J. VANEK, USN

APPENDIX III

ESSENTIAL VECTOR AND RESERVOIR SURVEILLANCE EQUIPMENT

Description	NSN
1. TRAP, MOSQUITO, LIGHT, BATTERY-POWERED	3740-01-106-0091*
2. BATTERY, GEL-CELL	6140-00-432-0490
3. CHARGER, BATTERY	6130-00-629-7396
4. DIPPER, ENTOMOLOGICAL, PLASTIC, WHITE	7730-00-149-1196
5. ASPIRATOR, MOSQUITO, MECHANICAL, BATTERY	(Open purchase item)
6. NET, INSECT	6640-00-435-6100
7. FLASHLIGHT, RIGHT ANGLE	6230-00-264-8261
8. MAGNIFIER, FOLDING, 14X	6650-00-431-4375
9. TRAP, CAGE, ANIMAL, COLLAPSIBLE, SELF-CLOSING, 12"X6"X6"	3740-00-472-2743*
10. TRAP, GLUE, RODENT (box of 24)	3740-01-240-6170
11. Miscellaneous administrative and data recording supplies.	

---

* Medical items (CLASS VIII) that must be requisitioned through medical supply channels.

APPENDIX IV

REQUEST FOR AND RESULTS OF TESTS

The attached forms (DD-1222) were completed and submitted to the cognizant authority upon request.

REQUEST FOR AND RESULTS OF TESTS

PAGE NO. 01 | NO. OF PAGES 01

SECTION A - REQUEST FOR TEST

1. TO:	2. FROM:
MEDICAL ZOOLOGY DIVISION NAVMEDRSCHU THREE CAIRO, EG	1LT E. M. DIESER 172ND MED DETACHMENT WEST CAIRO, EGYPT
3. PRIME CONTRACTOR AND ADDRESS N/A CONTRACT NUMBER	4. MANUFACTURING PLANT NAME AND ADDRESS N/A P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
N/A	01,02,03	N/A	ARTHROPOD IDENTIFICATION	210CT93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV. FOR SAMPLE & DATE
ARTHROPOD SPEC.	03 SPECIMENS	RANDOM COLLECTION	N/A

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
SURVEY COLLECTIONS	ETOH VIALS	

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

REQUEST SPECIMEN IDENTIFICATION.

17. SEND REPORT OF TEST TO

1LT DIESER, 172ND MED.DET., WEST CAIRO, EGYPT

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER
240CT93	250CT93	SMP0CT931

4 TEST PERFORMED	RESULTS OF TEST	SAMPLE RESULT	REQUIREMENTS

VIAL #01 - IDENTIFICATION: Scorpion, Family: BUTHIDAE (see attached information).

VIAL #02 - IDENTIFICATION: Sun Spider, Order: SOLPUGIDA (see attached information).

VIAL #03 - IDENTIFICATION: Mosquitoes, Culex pipiens (vector of Rift Valley fever and filariasis to humans in Egypt).

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
250CT93	LT Steven M. Presley, PhD, BCE	Steven M Presley

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

S/N 0102-LF-012-0600

REQUEST FOR AND RESULTS OF TESTS

PAGE NO 01 | NO OF PAGES 01

SECTION A - REQUEST FOR TEST

1. TO:	2. FROM:
MED 2002, DIV NAMRU-3 CAIRO, EGYPT	LT SARDELIS 17TH MED DET CAIRO WEST, EGYPT
3. PRIME CONTRACTOR AND ADDRESS N/A CONTRACT NUMBER	4. MANUFACTURING PLANT NAME AND ADDRESS N/A P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
N/A		N/A	ARTHROPOD ID	09NOV93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV. FOR SAMPLE & DATE
ARTHROPOD SPEC	08 MOSQ.	RANDOM COLLECTION	N/A

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
SURVEY COLLECTIONS	ETOH VIAL	

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

Request specimen identification
Vial #1

17. SEND REPORT OF TEST TO
LT Sardelis @ Cairo W. Airport

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER
09NOV93	09NOV93	—

4. TEST PERFORMED	RESULTS OF TEST	SAMPLE RESULT	REQUIREMENTS
Insect Identification	A. 2 Female Culex perexiguus		
	B. 2 Male Culex pipiens		
	C. 5 Female Culex pipiens		

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
11/9/1993	Hanafi A. Hanafi Medical Research Assistant	Hanafi

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

S/N 0102-LF-012-0600

REQUEST FOR AND RESULTS OF TESTS

PAGE NO 1 | NO OF PAGES 1

SECTION A - REQUEST FOR TEST

1 TO:	2. FROM:
MED ZOOL. DIV NAMRU-3 CAIRO, EGYPT	1LT SARDELIS 172ND MED DET Cairo W., EGYPT
3. PRIME CONTRACTOR AND ADDRESS N/A CONTRACT NUMBER	4. MANUFACTURING PLANT NAME AND ADDRESS N/A P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
—	—	—	ARTHROPOD ID	16 Nov 93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV FOR SAMPLE & DATE
ARTH. SPECIMEN	3 vials	Random Collection	—

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
—	Hand Carried	10 Nov 93, 16 Nov 93

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

Vial # 1 - Assortment of insects on sandfly trap; Family name, ok; "Complete" ID of enything of medical importance.

Vial # 2 - Captured near El Hamman

Vial # 3 - Captured @ Cairo W.

17. SEND REPORT OF TEST TO

LT SARDELIS @ CAIRO w. Airport (Ref.: Dr Presley)

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER

4 TEST PERFORMED	RESULTS OF TEST	SAMPLE RESULT	REQUIREMENTS

IDENTIFICATION

sample #1 - MISC. COLEOPTERA & HYMENOPTERA

sample #2 - Buthus occitanus (mod-highly toxic)

Sample #3 - Buthotus spp (low-mod toxic)

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
24 NOV 93	LT STEVEN M PRESLEY, PhD, BCE MEDICAL ENTOMOLOGIST	Steven M Presley

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

REQUEST FOR AND RESULTS OF TESTS

PAGE NO 01 | NO OF PAGES 01

SECTION A - REQUEST FOR TEST

1. TO:
MEDICAL ZOOLOGY DIVISION
(ATTN: LT S. M. Presley)
Naval Medical Research Unit No. 3
Cairo, Egypt

2. FROM:
Capt Leslie Spangler
Preventive Medicine Officer
Operation Restore Hope
Cairo West Airbase, Cairo Egypt
comm: 263-2340 ext.113

3. PRIME CONTRACTOR AND ADDRESS
N/A

CONTRACT NUMBER

4. MANUFACTURING PLANT NAME AND ADDRESS
N/A

P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
DRIED RICE	01 & 02	N/A	Suspected insect infestation	16NOV93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV. FOR SAMPLE & DATE
DRIED RICE	2 - 1KG samples	?	N/A

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
Oasis Hotel, Cairo Egypt	hand delivered	15NOV93 by Capt Spangler

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

IDENTIFY AND QUANTIFY INSECT INFESTATION LEVELS FOR ACTION RECOMMENDATION.

ACTION RECOMMENDATIONS PER MILSTD-904.A (Guidelines for detection, evaluation and prevention of pest infestation of subsistence); specifically, levels of tolerance established as follows: 1 Dermestid beetle, 3 flour beetles, up to 7 of any other species is tolerable if product is sifted prior to consumption (per 1 LB sample tested).

17. SEND REPORT OF TEST TO
ADDRESSOR (Capt Spangler)

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER
16NOV93	17NOV93	321/3SMP

TEST PERFORMED — RESULTS OF TEST — SAMPLE RESULT — REQUIREMENTS

IDENTIFICATION/QUANTIFICATION OF INSECT INFESTATION.

SAMPLE #01: "Loose" rice sample collected from bin (ca. 1.04 KG)
12 - Confused Flour Beetles @ 5.5 beetles/1 LB (not fit for consumption)
(*Tribolium confusum*) Family: Tenebrionidae

SAMPLE #02: Boxed rice sample, Pearl Rice/Egyptian Rice (ca. 0.96 KG)
13 - Confused Flour Beetles @ 5.9 beetles/1 LB (not fit for consumption)
(*Tribolium confusum*) Family: Tenebrionidae
03 - Saw-Toothed Grain Beetles @ 1.4 beetles/ 1 LB (acceptable if sifted)
(*Oryzaephilus surinamensis*) Family: Cucujidae
01 - Dried (unidentifiable) insect caterpillar (ca. 3/4" long)
01 - mouse pellet

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
17NOV93	LT STEVEN M. PRESLEY, PhD, BCE Medical Entomologist	Steven M. Presley, LT, MSC, USNR

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

S/N 0102-LF-012-0600

REQUEST FOR AND RESULTS OF TESTS

PAGE NO. 01 | NO OF PAGES 01

SECTION A - REQUEST FOR TEST

1. TO:	2. FROM:
MEDICAL ZOOLOGY BRANCH (ATTN: LT S. M. Presley Naval Medical Research Unit No. 3 Cairo, EG	Capt Leslie Spangler Preventive Medicine Officer Operation Restore Hope Cairo West AFB, EG
3. PRIME CONTRACTOR AND ADDRESS N/A CONTRACT NUMBER	4. MANUFACTURING PLANT NAME AND ADDRESS N/A P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
RICE (packaged) - sample #01 FLOUR (loose) - sample #02	01 - 02	N/A	Suspected insect infestation	22NOV93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV. FOR SAMPLE & DATE
RICE & FLOUR	2 samples	?	N/A

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
OASIS HOTEL, CAIRO, EGYPT	Hand delivered	22NOV93

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

INSPECT, IDENTIFY AND QUANTIFY INSECT INFESTATION.

17. SEND REPORT OF TEST TO

ADDRESSOR

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER
22NOV93	24NOV93	328/3SMP

4. TEST PERFORMED	RESULTS OF TEST	SAMPLE RESULT	REQUIREMENTS

INSPECTION OF SUBMITTED SAMPLES.

Sample #01 - ca. 1 KG RICE; NO INSECTS FOUND.

Sample #02 - ca. 250Gg FLOUR; NO INSECTS FOUND.

BOTH SAMPLES WERE FOUND TO BE FREE OF INSECTS, NO ACTION RECOMMENDATIONS MADE.

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
24NOV93	LT STEVEN M. PRESLEY, PhD, BCE MEDICAL ENTOMOLOGIST	24NOV93 Steven M Presley

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

S/N 0102-LF-012-0600

REQUEST FOR AND RESULTS OF TESTS

PAGE NO. 01 | NO. OF PAGES 01

SECTION A - REQUEST FOR TEST

1 TO:
MEDICAL ZOOLOGY BRANCH (ATTN: LT PRESLEY)
NAVAL MEDICAL RESEARCH UNIT THREE
CAIRO, EGYPT

2. FROM:
Capt L. SPANGLER
PREVENTIVE MEDICINE OFFICER
OPERATION RESTORE HOPE
CAIRO WEST AFB, EGYPT

3. PRIME CONTRACTOR AND ADDRESS
N/A

CONTRACT NUMBER

4. MANUFACTURING PLANT NAME AND ADDRESS
N/A//

P. O. NUMBER

5. END ITEM AND/OR PROJECT	6. SAMPLE NUMBER	7. LOT NO.	8. REASON FOR SUBMITTAL	9. DATE SUBMITTED
RICE	01 & 02	N/A	Gspct Insect Infestation	26NOV93

10. MATERIAL TO BE TESTED	10a. QUANTITY SUBMITTED	11. QUANTITY REPRESENTED	12. SPEC. & AMEND AND/OR DRAWING NO. & REV. FOR SAMPLE & DATE
RICE	#01=8.3oz/#2=12.9oz	?	N/A

13. PURCHASED FROM OR SOURCE	14. SHIPMENT METHOD	15. DATE SAMPLED AND SUBMITTED BY
OASIS HOTEL	HAND DELIVERED	26NOV93

16. REMARKS AND/OR SPECIAL INSTRUCTIONS AND/OR WAIVERS.

INSPECT & IDENTIFY INSECT INFESTATION.

17. SEND REPORT OF TEST TO
ADDRESSOR

SECTION B - RESULTS OF TEST *(Continue on plain white paper if more space is required)*

1. DATE SAMPLE RECEIVED	2. DATE RESULTS REPORTED	3. LAB REPORT NUMBER
26NOV93	29NOV93	

4. TEST PERFORMED	RESULTS OF TEST	SAMPLE RESULT	REQUIREMENTS

INSPECTION/IDENTIFICATION

#01 - ca. 8.3oz - 2 adult Red Flour Beetles (Tribolium castaneum)
2 larvae "

#02 - ca. 12.9oz - 3 adult ? Flour Beetles (Tribolium spp.) (broken-up specimens)
1 adult Saw toothed Grain Beetle (Oryzaephilus surinamensis)

RECOMMENDATIONS: #01 - dispose (exceeds MILSTD 904.A tolerance)
#02 - dispose (exceeds MILSTD 904.A tolerance)

DATE	TYPED NAME AND TITLE OF PERSON CONDUCTING TEST	SIGNATURE
29NOV93	LT STEVEN M. PRESLEY, PhD, BCE Medical Entomologist	S M Presley

DD FORM 1 FEB 62 1222 REPLACES DD FORM 1222, 1 JUL 58, WHICH IS OBSOLETE.

S/N 0102-LF-012-0600